

515 **CLAIMS**

What is claimed is:

1. An information pattern for determination of a transverse position from compound phase measurements of signals obtained from a sensor that scans a surface in a particular
520 “track” direction.
2. The means set forth in claim 1 wherein the pattern comprises bursts having various rates of change of phase as the transverse position is changed.
- 525 3. The means set forth in claim 2 wherein the phases of various bursts are combined mathematically to enhance the resolution or to provide absolute position information.
4. The means set forth in claim 3 wherein phase cycles of certain higher order bursts are subdivided into segments each of which corresponds to a full phase cycle of a lower order
530 burst.
5. The means set forth in claim 4 wherein the numbers of phase segments of all higher order bursts are relatively prime integer multiples of cycles of the least significant or finest phase pair.
535
6. The means set forth in claim 5 wherein the relatively prime integers are chosen such that simple algorithms are used to decode the segment numbers measured for each higher order burst to determine the unique cycle number (within the product of factors) of the fundamental phase pair.
540
7. The means set forth in claim 6 wherein combination of the decoded number of the fundamental cycle along with the fractional portion of the phase of the fundamental provides an absolute position coordinate with range equal to the product of the relatively prime numbers of segments in higher order bursts and with accuracy of the least
545 significant or fundamental pair.

8. The means set forth in claim 4 wherein the phase of a certain burst or the phase difference of a pair of bursts form a finest or fundamental phase measure and phase cycles of successively higher order are subdivided into an integer number of segments each of which corresponds to a full cycle of the previous, less significant burst.
9. The means set forth in claim 8 wherein the value of the segment index in a burst denotes the integer number of fundamental cycles equal to said index multiplied by the total number of segments in each of the bursts of lesser significance.
10. The means set forth in claim 9 wherein the position relative to a zero reference is computed as total number of fundamental cycles obtained as the sum of each segment index times its value plus the fractional cycle measured for the fundamental phase unit.
11. The means set forth in claim 10 wherein the number of segments in each burst is equal to a common integer or radix which yields a positional number system for the transverse coordinate similar to commonly used binary, octal, decimal, and hexadecimal systems.
12. The means set forth in claim 10 wherein certain information blocks of the pattern are abbreviated in order to increase the portion of the surface available for other purposes.
13. The means set forth in claim 10 wherein the bursts of higher can be decoded to provide a coarse position coordinate useful for rapid transverse motion over large strokes.